

## § 434.501

provide both space heating and service water heating. Exceptions are as follows:

(a) The energy input or storage volume of the combined boiler or water heater is less than twice the energy input or storage volume of the smaller of the separate boilers or water heaters otherwise required or

(b) The input to the combined boiler is less than 150,000 Btuh.

### **Subpart E—Building Energy Cost Compliance Alternative**

#### **§ 434.501 General.**

501.1 Subpart E permits the use of the Building Energy Cost Compliance Alternative as an alternative to many elements of subpart D. When this subpart is used, it must be used with subpart C and subpart D, 401.1, 401.2, 401.3.4 and in conjunction with the minimum requirements found in subsections 402.1, 402.2, and 402.3., 403.1, 403.2.1–7, 403.2.9 and 404.

501.2 *Compliance.* Compliance under this method requires detailed energy analyses of the entire Proposed Design, referred to as the Design Energy Consumption; an estimate of annual energy cost for the proposed design, referred to as the Design Energy Cost; and comparison against an Energy Cost Budget. Compliance is achieved when the estimated Design Energy Cost is less than or equal to the Energy Cost Budget. This subpart provides instructions for determining the Energy Cost Budget and for calculating the Design Energy Consumption and Design Energy Cost. The Energy Cost Budget shall be determined through the calculation of monthly energy consumption and energy cost of a Prototype or Reference Building design configured to meet the requirements of subsections 401 through 404.

501.3 Designers are encouraged to employ the Building Energy Cost Budget compliance method set forth in this section for evaluating proposed design alternatives to using the elements prescribed in subpart D. The Building Energy Cost Budget establishes the rel-

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ative effectiveness of each design alternative in energy cost savings, providing an energy cost basis upon which the building owner and designer may select one design over another. This Energy Cost Budget is the highest allowable calculated energy cost for a specific building design. Other alternative designs are likely to have lower annual energy costs and life cycle costs than those used to minimally meet the Energy Cost Budget.

501.4 The Energy Cost Budget is a numerical reference for annual energy cost. Its purpose is to assure neutrality with respect to choices such as HVAC system type, architectural design and fuel choice by providing a fixed, repeatable budget that is independent of any of these choices wherever possible (*i.e.*, for the prototype buildings). The Energy Cost Budget for a given building size and type will vary only with climate, the number of stories, and the choice of simulation tool. The specifications of the prototypes are necessary to assure repeatability, but have no other significance. They are not necessarily recommended energy conserving practice, or even physically reasonable practice for some climates or buildings, but represent a reasonable worst case of energy cost resulting from compliance with the provisions of subsections 401 through 404.

#### **§ 434.502 Determination of the annual energy cost budget.**

502.1 The annual Energy Cost Budgets shall be determined in accordance with the Prototype Building Procedure in § 434.503 and § 434.504 or the Reference Building Procedure in § 434.505. Both methods calculate an annual Energy Cost by summing the 12 monthly Energy Cost Budgets. Each monthly Energy Cost Budget is the product of the monthly Building Energy Consumption of each type of energy used multiplied by the monthly Energy Cost per unit of energy for each type of energy used.

502.2 The Energy Cost Budget shall be determined in accordance with Equation 502.2.a as follows:

$$ECB = ECB_{jan} + \dots + ECB_m + \dots + ECB_{dec} \quad (\text{Equation 502.2. a})$$

Based on:

$$ECB_m = BECON_{m1} \times ECOS_{m1} + \dots + BECON_{mi} \times ECOS_{mi} \quad (\text{Equation 502.2. b})$$

Where:

ECB = The annual Energy Cost Budget

ECB<sub>m</sub> = The monthly Energy Cost Budget

BECON<sub>mi</sub> = The monthly Budget Energy Consumption of the i<sub>th</sub> type of energy

ECOS<sub>mi</sub> = The monthly Energy Cost, per unit of the i<sub>th</sub> type of energy

502.3 The monthly Energy Cost Budget shall be determined using current rate schedules or contract prices available at the building site for all types of energy purchased. These costs shall include demand charges, rate blocks, time of use rates, interruptible service rates, delivery charges, taxes, and all other applicable rates for the type, location, operation, and size of the proposed design. The monthly Budget Energy Consumption shall be calculated from the first day through the last day of each month, inclusive.

#### § 434.503 Prototype building procedure.

503.1 The Prototype Building procedure shall be used for all building types listed below. For mixed-use buildings the Energy Cost Budget is derived by allocating the floor space of each building type within the floor space of the prototype building. For buildings not listed below, the Reference Building procedure of § 434.505 shall be used. Prototype buildings include:

- (a) Assembly;
- (b) Office (Business);
- (c) Retail (Mercantile);
- (d) Warehouse (Storage);
- (e) School (Educational);
- (f) Hotel/Motel;
- (g) Restaurant;
- (h) Health/Institutional; and
- (i) Multi-Family.

#### § 434.504 Use of the prototype building to determine the energy cost budget.

504.1 Determine the building type of the Proposed Design using the cat-

egories in subsection 503.1. Using the appropriate Prototype Building characteristics from all of the tables contained in subpart E, the building shall be simulated using the same gross floor area and number of floors for the Prototype Building as in the Proposed Design.

504.2 The form, orientation, occupancy and use profiles for the Prototype Building shall be fixed as described in subsection 511. Envelope, lighting, other internal loads and HVAC systems and equipment shall meet the requirements of subsection 301, 401, 402, 403, and 404 and are standardized inputs.

#### § 434.505 Reference building method.

505.1 The Reference Building procedure shall be used only when the Proposed Design cannot be represented by one or a combination of the Prototype Building listed in subsection 503.1 or the assumptions for the Prototype Building in Subsection 510, such as occupancy and use-profiles, do not reasonably represent the Proposed Design.

#### § 434.506 Use of the reference building to determine the energy cost budget.

506.1 Each floor shall be oriented in the same manner for the Reference Building as in the Proposed Design. The form, gross and conditioned floor areas of each floor and the number of floors shall be the same as in the Proposed Design. All other characteristics, such as lighting, envelope and HVAC systems and equipment, shall meet the requirements of subsections 301, 401, 402, 403 and 404.

#### § 434.507 Calculation procedure and simulation tool.

507.1 The Prototype or Reference Buildings shall be modeled using the